Energy Generation using Rocking Chair

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ABSTRACT

Engineering plays vital role in the fast-running world. Technology plays significant role in the production of new things in day-to-day world. Energy storage is the main key to rule this technological world today. This work mainly focuses to diminish the energy shortage using the human energy with rocking chair mechanism. In this work, the energy generated will be continuous. This work focuses on the use of the human exercising effort and converts it to energy generation. The strategy serves to give complete body workout with zero side effects. In this work, the rocking chair mechanism and ratchet-pawl mechanism are utilized to convert the human energy into electrical energy completely. The armchair is associated with wheel using the swing support. The ratchet and pawl mechanism are mounted in this setup makes to rotate wheel in clockwise direction. The wheel turns clockwise direction will be associated with the wheel-pulley assembly. Based on the rotatory motion of the wheel, the wheel- pulley assembly transfers the human energy to the alternator connected with it. The alternator is utilized to convert and transmits the energy to the battery. The battery will be utilized to store the energy. Many countries utilize the human efforts to convert to energy generation and complete workout. This work mainly focuses also on the energy generation for future needs and also in the emergency situations. This work is an emerging technology. This method of energy generation is less cost, pollution-free and helps to convert the human energy in useful way. The energy generation using this method is mainly to fulfill the needs emergency and also in daily needs.

KEYWORDS: Energy generation, rocking chair mechanism and ratchet and pawl mechanism

I. INTRODUCTION

Energy is the main impetus of present-day societies, age and usage of energy are fundamental for socioeconomic development. Per- capita energy consumption levels are regularly viewed as a decent proportion of financial turn of events. In late years, energy shortage has become a significant issue because of consumption of non-sustainable power sources, expanding populace, globalization of energy serious financial turn of events, ecological contamination, and an Earth-wide temperature boost. As of late, there have been many fascinating advancements with regards to the field of human power conversion. For this, one can use human energy by the rocking chair mechanism of a person sitting on a seat, housed inside a large wheel, within another wheel (rollers / balls placed in between the wheels) to produce power. The electricity generation plays significant role in the storage and future use in light of the demand. When enormous number of youngsters plays in a school jungle gym, part of the force of their play can conveniently be outfit bringing about huge energy stockpiling. This put away energy would then be able to be changed over to power for fueling fundamental, low force machines in the school like lights, fans, correspondences hardware, etc. The technique gives a minimal effort, low asset methods for age of assistant electric force, particularly for use in agricultural nations. In this work, human energy is utilized completely and changed over to the electrical energy utilizing the alternator. The future generation can live without less disease and can lead the life in both healthier and also in happy way. Energy need of today's modern world is growing day by day because of consumption of some or larger extent or amount of growing population. Technology grows daily with new and unbelievable ideas, products and to enhance the lifestyle of people day by day in view of the growing world. Technology mainly focuses on the automation, for automation energy generation only helps to move forward safer and in successive way. For reduction of energy scarcity, this works supports human to use their working energy in useful way. This work will give many advantages like complete body work out, complete and break less supply of energy, energy generation for future needs and etc. can be accomplished easily. This work predominantly focuses on the energy generation with the human work out effect. This helps to decrease the human body problems easily and also with less effort. The energy generation depends on the human capability to swing in the chair. The human effort will be changed over to energy generation using the alternator setup and gear pulley assembly. The rocking chair mechanism will help to produce the energy in light of the human's swinging motion. To achieve the energy generation

some mechanisms are to be used. They are system utilized in the work are talked about underneath.

1.1. Energy Generation
Power generation is the way toward creating electric force from wellsprings of essential energy. Power isn't unreservedly accessible in nature, so it should be "delivered" (that is, changing different types of energy to power). For utilities in the electric force industry, it is the stage preceding its conveyance (transmission, dissemination, and so forth) to end clients or its stockpiling (utilizing, for instance, the siphoned stockpiling technique). Power is regularly created at a force plant by electromechanical generators, fundamentally determined by heat motors energized by burning or atomic parting yet in addition by different methods like the active energy of streaming water and wind. Other fuel sources incorporate sun-based photovoltaics and geothermal force.

1.2. Energy Generation Methods
Several crucial techniques exist to change over different types of energy into electrical energy. Utility-scale age is accomplished by pivoting electric generators or by photovoltaic frameworks.
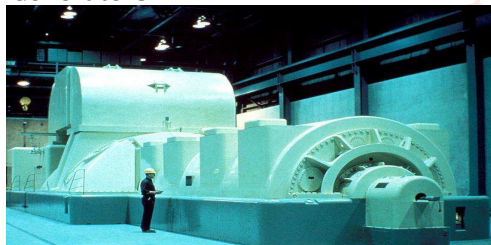
1.2.1. Generators

Figure 1.1 U.S. NRC image of a modern steam turbine generator (STG)

The figure 1.1 shows U.S. NRC image of a modern steam turbine generator (STG). Electric generators change motor energy into power. This is the most utilized structure for producing power and depends on Faraday's law. It very well may be seen tentatively by turning a magnet inside shut circles of directing material (e.g., copper wire). Practically all business electrical age is finished utilizing electromagnetic enlistment, in which mechanical energy powers a generator to pivot.

1.2.2. Electrochemistry
The figure 1.2 shows the energy generation using thermal energy. Electrochemistry is the immediate change of substance energy into power, as in a battery. Electrochemical power age is significant in versatile and portable applications. At present, most electrochemical force comes from batteries.
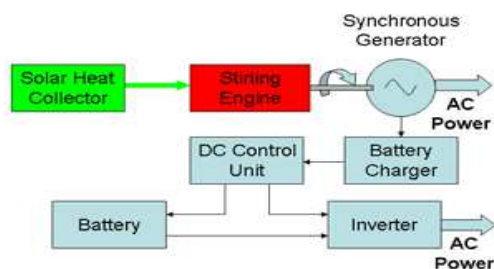
Figure 1.2 Energy Generation using thermal energy

Energy Generation using thermal energy Essential cells, for example, the basic zinc–carbon batteries, go about as force sources straightforwardly, yet auxiliary cells (for example

battery-powered batteries) are utilized for capacity frameworks as opposed to essential age frameworks. Open electrochemical frameworks, known as energy units, can be utilized to remove power either from common powers or from blended energizes.

Osmotic force is a chance at where salt and new water combine.

1.2.3. Photovoltaic effect
The figure 1.3 shows the energy generation using the solar energy. The photovoltaic impact is the change of light into electrical energy, as in sun-oriented cells.
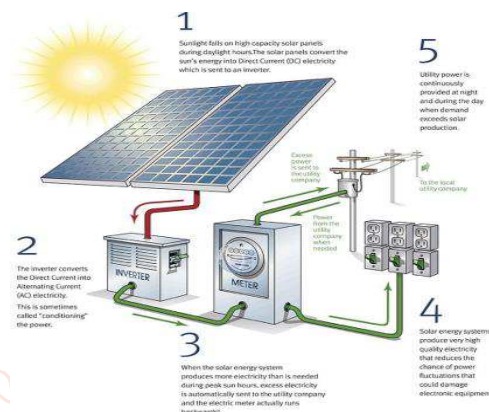

Figure 1.3 Solar Energy Generation

Photovoltaic boards convert daylight straightforwardly to DC power. Force inverters would then be able to change that over to AC power if necessary. Despite the fact that daylight is free and plentiful, sun based force power is still typically more costly to deliver than huge scope precisely created power because of the expense of sun oriented boards.

1.3. Energy generation using the rocking chair mechanism
In this work, energy generation is done using the rocking chair which is housed inside a large wheel, within another wheel (rollers / balls placed in between the wheels). Human workout is the key thing in this work to produce energy continuously for future purpose. The mechanism mainly utilized in this work are rocking chair and ratchet-pawl mechanisms. This work gives the continuous energy by the wholesome workout of human being. By the housing of the rocking chair inside the wheel, the safety is very high while doing the workout. The alternator plays major role in converting and communicating energy to the battery for storing and using the energy for future generation purpose. The wheel and pulley assembly are utilized to transfer the rotational energy to alternator to convert it to electrical energy. In this work, continuous energy is produced for the future needs. This will satisfy the basic needs in emergency situations also. Persistent inventory of energy will be accomplished in this work. The energy generation efficiency mainly depends on the human work out capability in this setup. The rocking chair is the key thing in this work to achieve enormous energy continuously.

1.4. Mechanisms used in the Work
The mechanisms used in the work are discussed.

1.4.1. Rocking Chair Mechanism
In this work, the recliner mechanism is the movement of the wheels regarding the movement of the seat oscillation. When the seat begins oscillating, the wheel will move clockwise way. The wheel moves in clockwise direction by the free wheel mechanism using ratchet and pawl setup.

1.4.2. Ratchet and Pawl Mechanism

In this work, when the seat begins swaying, the pawl begins to move the wrench wheel clockwise way. In view of this development, the external wheel begins to pivot clockwise way. The external wheel will be associated with the wheel-pulley gathering.

In light of the rotation, human energy is transferred from the wheel-pulley assembly using outer wheel will be transmitted to alternator. The alternator will convert and transmit energy to battery. The above mechanisms play vital role to converted the human energy to energy generation for future generation. Based on the mechanisms, gear- pulley assembly and alternator setup, the energy generation of the entire framework is accomplished and it is put away in the battery for use in crisis circumstances and furthermore for the future reason.

The energy age dependent on the swinging movement helps to have the continuous energy generation. By this work, many advantages can be accomplished by human beings.

1.5. Need of the work

Without electricity, whole world will get stopped to run daily life. Energy generation method using traditional techniques are getting down because of the usage. In this current situation, the new method of energy generation is required to lessen the energy scarcity.

The energy scarcity plays important role which is mainly arrived due to increment of human population with usage. Traditional method of energy generation is getting less efficient based on performance. The power production is getting incremented step by step dependent on the usage. Wastage of energy plays significant job in this scarcity. If this continues means, the energy for future generation will suffer to fulfill the basic needs.

1.6. Benefits of the Work

A portion of the advantages of the works are:

1. Burning of unwanted calories is achieved. Energy generation for the future needs is achieved.

2. Reduce the amount spent for any treatment to make human body healthier.

3. Persistent stockpile of energy for satisfying the commodities which require energy.

4. This helps to diminish the energy generation problems from the energy stations for the city or any surroundings.

5. Everyday energy consumption should be possible and utilized with less effort. Calories burnt will be seen by us easily with this work as energy generation.

6. The energy generation setup is mainly working on the human swinging motion, alternator setup with some precaution measures.

The above points mentioned are the benefits mainly achieved using the work.

II. LITERATURE REVIEW

Alejandro Rodríguez-Molina et al [1] (2020) discussed about an aberrant versatile control dependent on online multi-target streamlining is proposed to manage the speed of the four-bar instrument and increment its lifetime by smoothing the control activity under the impacts of vulnerabilities.

In this work, a multi-target enhancement issue is expressed and afterward tackled by the novel Online Hypervolume-based Differential Evolution (O-HV-MODE) so that few promising model boundary designs are figured out progressively, with various compromises among the presentation requests. The proposed control is approved through test tests and the unwavering quality of the outcomes with the 99% Confidence Interval test.

Likewise, the proposition is contrasted and cutting edge direct and non-straight control draws near.

Amir Hosein Sakhaei et al [2] (2017) discussed about an way to deal with make agreeable fastener like instruments that take benefits of multi-material 3D printing innovation and to supplant conventional components.

This work empowers the disposal of springs and worldwide development of the pawl or stuff that normally exist in traditional fasteners. In this, performed further investigations on what material and mathematical boundaries mean for the mechanical presentation of the proposed instrument.

M.S. Anoop et al [3] (2020) described about the failures and optimization in the shaft design of alternator in rail coaches.

In this, the pressure fixation is assessed and the justification the breakage is likewise found. In this work, the reasons discovered for shaft breakage is basically by the filet area behind the shape for pulleys and furthermore by the instrument materials utilized in the shaft.

Ayneendra B et al [4] (2017) said about the new method of producing energy through the swinging motion.

In this work, the force is created by utilizing a swing so that when it swings the mechanical energy is produced and it is changed over into electrical energy by a commutator and is put away in a battery. In this new and elective technique for energy age utilizing the swinging movement is performed. The mechanical energy is totally used for energy age straightforwardly in this work.

The battery unit is utilized to store the total electrical energy created utilizing mechanical energy. The energy usage and capacity are high in this strategy.

M.A. Bek et al [5] (2020) depicted movement of an energized damped spring pendulum. The overseeing arrangement of movement is inferred utilizing Lagrange's conditions contemplating the presence of outer powers following up on the researched framework.

Presumed that this work is for the most part utilized in the fields of shipbuilding, submarines and designing machines which have damping to manage vibrations.

Bianca Rodrigues de Oliveira et al [6] (2020) described the assessment of indicative affectability of weight record (BMI) to distinguish stoutness as per distinctive remove focuses to group a high muscle versus fat ratio (%BF) in teenagers and youthful grown-ups.

In this work, the stoutness level for grown-ups and youthful grown-ups are assessed by the weight record.

K. Durkopp et al [7] (1993) described about the interrelationship between wear and friction in the free wheels. This place of business the impact of the particular contact factor on the plan and usefulness of such coupling gadgets. various sorts of wear.

The examples utilized in these tests shows wear designs which are ordinary in free wheels.

Gokul S P et al [8] (2016) described about a new method for human force transformation dependent on youngsters' play on jungle gym swing. The force tackled can be utilized as a helper or back-up hotspot for power, particularly in agricultural nations.

A swing has been planned and created and test results are acquired which outline the reasonable viability of power age. In this work, the human energy is changed over to electrical energy totally utilizing span rectifier and battery. This work can be carried out at different parks, play houses, schools and so forth can surely let down the heap on primary framework hence helping saving power.

Jiaying Zhang et al [9] (2016) described about a basic brilliant design model to research the reconfiguration of a four-bar component through stage space associations. The reconfiguration technique is utilized to research the conduct of a more sensible flexible savvy structure model.

Jing Zhang et al [10] (2018) discussed about the pressure focus to be kept away from and to build the rotational point of flexure joint.

In this, properties of flexure joint are assessed to accomplish rotational movement. Limited component model is set up to compute the pressure, miss happening, force.

Juan Vicente Avelar et al [11] (2012) described about the Play Park Human Powered Generator adventure watches out for various techniques for delivering power. More specifically, this endeavor includes the arrangement and advancement of the Swing Power Generator to give electrical power from mechanical energy.

The swing generator will in the end be used as a part of the human-energized generators utilized in the DC House adventure. A swing generator model was worked for this venture, which exhibits the achievability of its utilization for electrical force.

Juntakan Taweekun et al [12] (2018) described that energy need of today's world is growing daily because of consumption of larger extent of electricity due to growing population. Project is about generation of electricity by swing. In this work, new method of energy generation is described using the swinging was described.

In this human energy is completely utilized to generate the energy for what's to come needs. The technique gives a minimal effort, low-asset methods for power age, contamination free framework, DC yield can likewise be accomplished, upkeep is simple particularly to use in agricultural nations. The prototype can be installed in parks, schools, picnic points and homes.

The electricity produced can be efficiently used to light the places described above.

Lakshya Shrivastava et al [13] (2020) described about the the construction and designing of the system which is being analyzed by finite element method and designed by considering all safety conditions according to the vehicle used.

The component estimations are laid out by the assistance of outlines represented and the limited component investigation is conveyed to examine a collection of stresses in ratchet haggle.

Liang Zhao et al [14] (2020) depicted about the correlation made between environmentally friendly power sources like breeze, photovoltaic (PV), and amassing sun-oriented force in North African district to address the energy interest. Moreover, pressing sun-based power in North African region to comprehend the energy interest.

The results show that harmless to the ecosystem power got together with power age, including the CSP mode, can improve constancy of the power supply and abatement the power decreasing rate. In this, an ideal harmless to the ecosystem power age arranging model was set up and applied to design the force sizes of three sorts sustainable power age in Morocco, Egypt, and Tunisia through the time arrangement creation recreation method.

Priyesh Pradeep Revankar [15] (2017) said about the deltoid linkage is a kind of four bar linkage component in which the length of contiguous connections is equivalent. At such condition when one of the shorter links is fixed, then crank-crank or double crank is obtained. It means one shorter and one longer link acts as crank and another longer link as coupler between them.

Thus, when longer link is pivoted once, shorter link completes two rotations and when shorter link is rotated twice, longer link completes only one rotation. The principle motivation behind this exploration is to break down the movement of deltoid mechanism and determine what type of motion does it transmits. As no research has been done before on such mechanism this examination is completed manually, i.e., by observing and drawing the point of pivot of both the wrenches concerning each other. The model of deltoid mechanism is drawn by using CATIA V5R19.

Rameshwar Kadu et al [16] (2017) described about how we can change over pendulum movement of swing into electrical energy. Swing is for the most part utilized by kids for playing in parks and gyms that will create power during its utilization.

During swinging pendulum movement of shaft moves its movement to flywheel. This turning movement of flywheel is moved to low RPM generator which produces power in little scope. On the contrary side of shaft beating framework is related, which can be used to crush plastic waste assembled in the entertainment place or gym.

A. Samson [17] (1980) portrayed the states of development of a free-swinging compound (physical) pendulum were coordinated to acquire an overall answer for the slipped by time as a geometrical fundamental. The latter was reduced to Jacobian elliptic components of the principle kind, which were then understood by standard systems for complete and lacking integrals.

Applying the technique created to a summed-up pendulum portrayed by its level of compounding, the hour of its swaying while in frictionless movement for any point of dispatch was resolved. The level of compounding of the pendulum significantly affected its time of swaying. This was indicated graphically as the variety of a dimensionless time proportion with change in point of dispatch for different levels of compounding.

Five explicit instances of the time periods of a compound pendulum were examined and arrangements got. The overall condition for the past season of free-swinging movement of a straightforward (numerical) pendulum, dispatched from any

position and its period of13oscillation were additionally decided.

Sekiya Koike et al [18] (2019) described this examination proposed a technique to evaluate immediate and backhanded impacts of the joint force contributions to the speed-producing instrument of a swinging movement. Direct and precise increasing velocities of all sections inside a multi- connected framework can be communicated as the measure of commitments from a joint force term, gravitational power term and movement subordinate term (MDT), where the MDT is a nonlinear term comprising of radial power, Coriolis power and gyroscopic impact second segments.

Direct impacts result from rakish increasing speeds prompted by a joint force at a given moment, though aberrant impacts emerge through the MDT actuated by joint forces applied before. These two effects were assessed for the kicking side leg during a rugby place kick. The MDT was the greatest ally of the foot focal point of gravity (CG) speed at ball contact.

Of the elements answerable for producing the MDT, the immediate and backhanded impacts of the hip flexion-augmentation force during both the flight stage (from the last kicking foot take-off to help foot contact) and the resulting support stage (from help foot contact to ball contact) were significant supporters of the foot CG speed at ball contact.

The roundabout impact of the lower leg plantar dorsal flexion force and the immediate impact of the knee flexion-expansion force during the help stage demonstrated the biggest positive and negative commitments to the foot CG speed at ball contact, individually. The proposed strategy permits the distinguishing proof of which individual joint force tomahawks are vital and the timings of joint force effort that are utilized to deliver a rapid of the distal purpose of a multi-connected framework.

Jiaying Zhang et al [19] (2020) described that to identify the connection between the weight list and muscle to fat ratio structure with foot curve among osteoarthritis patients.

Y. Tao et al [20] (2017) discussed Human-induced wake ow attributes and its effect on molecule re-scattering from the floor was14investigated by performing CFD recreations of a moving warm puppet model. The puppet moved with practical kinematic movement which included swinging arms and legs.

This was performed utilizing dynamic-lattice which invigorated the matrix with each time step to speak to the puppet movement. The wake stream and liquid elements created from three strolling speeds (0.8m/s, 1.2m/s and 1.8m/s) were looked at. Molecule transport from the floor and its re-scattering was followed by the LaGrangian approach.

The outcomes demonstrated that the owed had a solid reliance on the strolling movement. For instance, the ow behind the body demonstrated a downwash ow beginning from the head, at mid-tallness the ow followed the puppet, and at the leg and feet, there was slight upwards ow. At the front of the body, ow smoothes out indicated the ow was pushed out and was pulled back around the body into the wake.

These ow designs gave the premise to molecule re-suspension from the floor and scattering through the air. After the puppet quit strolling, the wake proceeded with advances and disregarded the puppet body. At the point when the wake force disseminated, warm tuft impacts became critical which affected the airborne particles to spread after some time.

The molecule fixation entering the frontal zones of the body during the strolling was assessed to show the degree of inhabitant's presentation to impurities.

2.1. Summary of Literature
Based on the above literature surveys, the alternate energy generation methods are studied. By this the energy generation can be done using new method apart from traditional approach. By this, human energy will be converted to energy generation purpose. From the above literature review, the various methods of energy generation are studied.

2.2. Problem Identification
In light of writing survey gathered, the fundamental issues recognized are Lack of capacity of energy for group of people yet to come and to diminish the human load through complete exercise Converting the human exertion to an important asset to share and store it for future necessities.

Utilization of the put away energy can be utilized dependent on the requirements in homegrown items Reduce the individual load in a straightforward and furthermore in complete full body exercise without results

2.3. Objective of the Work
The objective of the work is To build the use of put away energy in the helpful way for group of people yet to come. To lessen the human load through a total body exercise. To change the human energy over to a significant asset for future necessities. To lessen the utilization of customary technique for energy age. To fulfill the essential and crisis needs.

III. METHOOLOGY
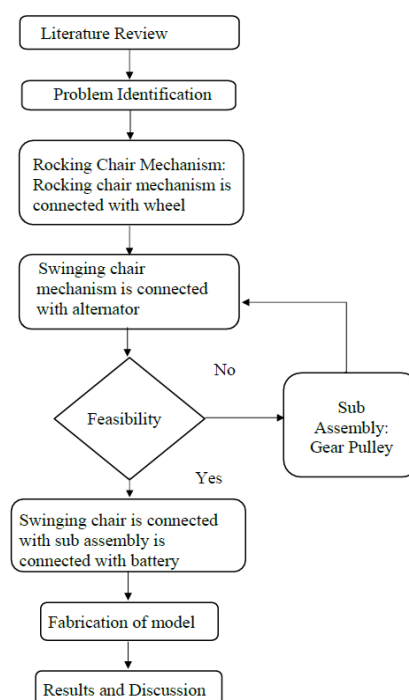Figure 3.1 shows flowchart of methodology used in this work.

Figure 3.1 Methodology

3.1. Formulating a Problem

Energy generation plays a key job in the technological world to fulfill the requirements. Presently a-days, energy shortage happens often because of the greater utilization of energy by human regularly for productive and unproductive work.

Review of literature conducted on the energy generation and its methods. In view of the audit, some conventional technique for energy age is getting less effective because of the energy use and wastage done by human.

3.2. Ideation

In light of the review of literature, the new method of energy generation using rocking chair by human is formulated.

By this method, the energy generation will be continuous, proper and also satisfy the basic needs without searching for the external/traditional energy generation. This method is safe, secure and less costly. This method is less hazardous to the environment. By this method, energy usage and storage will get satisfied. In this method human energy is changed over to electrical energy without wastage.

By this method, age and capacity of energy is very high with less effort and cost. This method is useful for both basic needs and emergency needs.

3.3. Conceptual Design & Simulation

Based on the audit of writing, the plan of armchair for energy age is detailed. In this stage, the plan of recliner is done dependent on the rule of Product Design. To start with, the seat is planned dependent on the human weight list.

The seat is mounted on the roller support. The roller support is amassed in the inward help wheel. The internal help wheel is utilized to control the seat mounted in roller backing to sway in both forward and invert heading. Ratchet and pawl is mounted outside the inner support wheel to turn the outer wheel in clockwise direction.

By this method, energy scarcity will be reduced effectively and easily. The energy generation will be achieved with less effort and without the assistance of external things.

3.4. Feasibility Check

The whole design of chair with wheel will be assembled with gear pulley assembly and also with the alternator.

The attainability study will be directed dependent on the plan of armchair instrument associated with gear pulley get together and furthermore with the alternator. Assuming it is practical, the recliner component associated with gear pulley gathering and furthermore with the alternator is associated with the battery. Assuming it isn't doable, gear pulley get together and the alternator arrangement will be examined and planned dependent on the armchair system.

3.5. Analysis

In this, the examination of the model will be continued. In light of the examination result, the cycle of manufacture will be continued after the displaying and recreation of the gathering model.
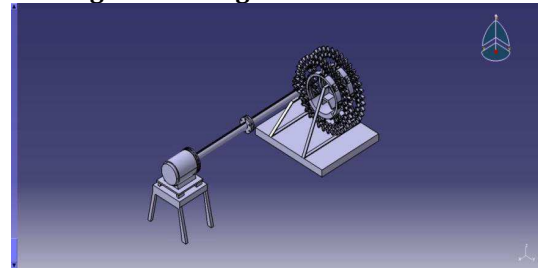
IV. Design of rocking chair model

Figure 4.1 Assembly of the Model

The figure 4.1 shows the assembly of the energy generation using rocking chair model. The fundamental motivation behind the work is to
➢ Give a total exercise to human body to lead a sound and safe life.
➢ Change of the human body exercise to deliver the energy for the homegrown requirements for the future purposes.
➢ The model is planned dependent on the human weight record to have well being exercise with less exertion.
➢ The energy age will assist with lessening the apathy of human in future and creation of energy will increment at the same time dependent on the exercise.

The assembly model main comprises of inner wheel, roller with the chair, inner support wheel, outer support wheel, outer wheel. The below figures show the inner wheel, roller with the chair, inner support wheel, outer support wheel, outer wheel models of respectively.

4.1. Parts in the Assembly

The parts in the assembly are
1. Guide wheel,
2. Roller Support with Chair,
3. Clamp,
4. Ratchet and Pawl
5. Outer Support Wheel
6. Outer Wheel
7. Stand
8. Outer wheel to transmit the rotation
9. Shaft
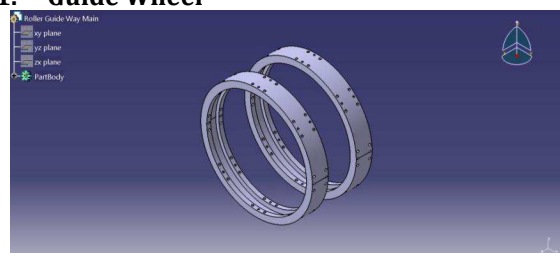10. Alternator
11. Alternator Stand

4.1.1. Guide Wheel

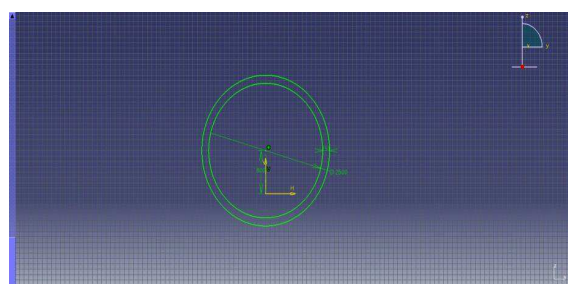**Figure 4.2 Guide Wheel 3D Model**

Figure 4.3 Guide Wheel 2D Sketch

The above figures 4.2 and 4.3 are the 3D model and sketch of the Inner Wheel. The inner wheel is called as guide wheel and used to guide the chair with the roller support. The guide wheel is fixed using the stand.

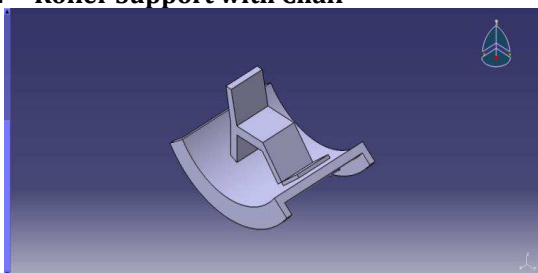### 4.1.2. Roller Support with Chair

Figure 4.4 Roller Support with Chair 3D Model

The above figure 4.4 shows the: Roller Support with Chair 3D Model. The above model is mounted on inner wheel. The model starts swinging for 400 in swinging directions. Based on the swinging motion in clockwise direction, the ratchet and pawl moves in clockwise direction.

4.1.3. Clamp
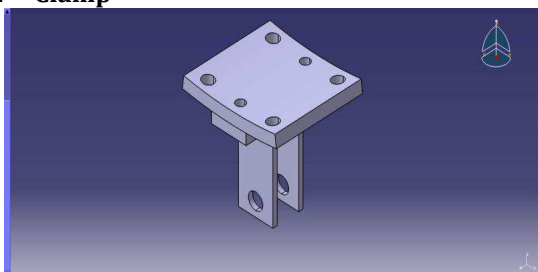
Figure 4.5 Clamp 3D Model

The above figure 4.5 shows the 3D model of the clamp. The clamp is attached with the roller guide. It is utilized to hold the ratchet and pawl to stop the slippage.

4.1.4. Ratchet and Pawl
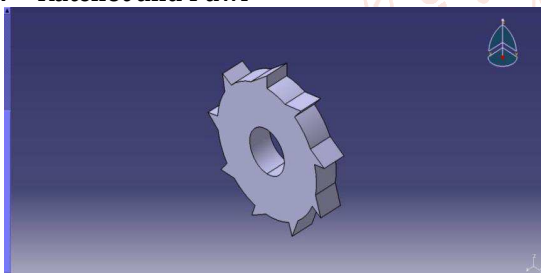
Figure 4.6 Ratchet and Pawl in 3D Model
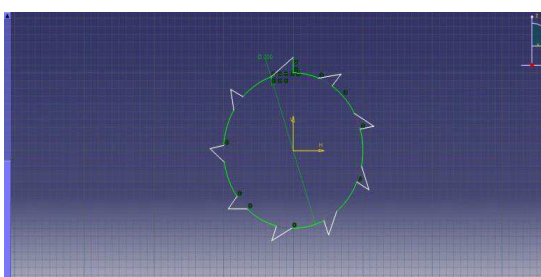
Figure 4.7 Ratchet and Pawl in 2D Sketch

The above figures 4.6 and 4.7 are the 3D model and sketch of the Ratchet and Pawl Wheel. The ratchet and pawl wheel rotates based on the swinging motion. The ratchet and pawl wheel is connected with the clamp.

Based on the clockwise motion swinging, ratchet and pawl makes the outer support wheel to rotate in clockwise direction. During reverse motion, the ratchet and pawl slips by that the outer support wheel will not rotate.

This is mainly used to restrict the counter clockwise motion of the outer support wheel.
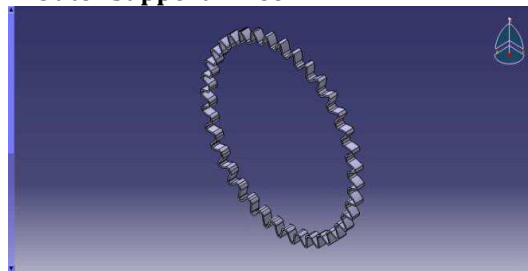
4.1.5. Outer Support Wheel

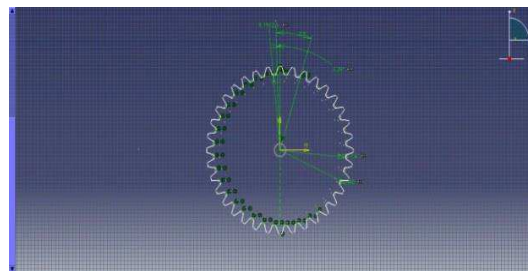**Figure 4.8 Outer Support Wheel in 3D Model**

Figure 4.9 Outer Support Wheel in 2D Sketch

The above figures 4.8 and 4.9 are the 3D model and sketch of the Outer Support Wheel. The outer support wheel is connected with the ratchet and pawl wheel is connected in order to rotate in clockwise direction only. By the clockwise motion, the outer wheel rotates in clockwise motion.
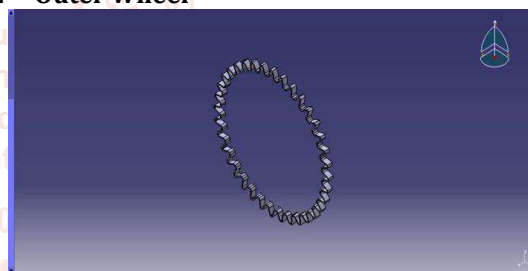
4.1.6. Outer Wheel
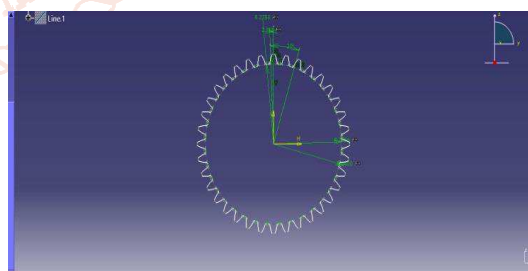

Figure 4.10 Outer Wheel in 3D Model

Figure 4.11 Outer Wheel in 2D Sketch

The above figures 4.10 and 4.11 are the 3D model and sketch of the Outer Wheel. The external help wheel is associated with the wrench and pawl wheel is associated to pivot clockwise way as it were. By the clockwise movement, the external wheel turns in clockwise movement.
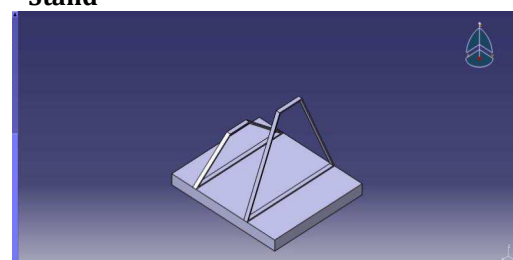
4.1.7. Stand

Figure 4.12 Stand in 3D Sketch

The above figure 4.12 shows the Stand in 3D sketch. The stand is used to support the whole assembly in the single position. This plays important role to make the whole system function properly.

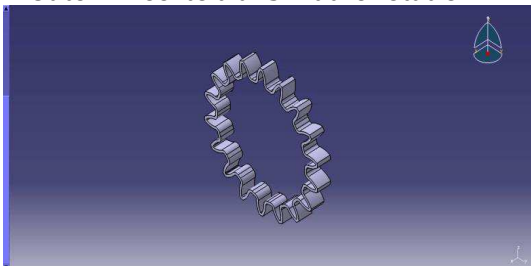### 4.1.8. Outer wheel to transmit the rotation

Figure 4.13 Outer Wheel to transmit the rotation 3D Model

The above figure 4.13 shows the Outer Wheel to transmit the rotation in 3D sketch. The Outer Wheel to communicate the turn of fundamental wheel to alternator utilizing the shaft. In view of the clockwise turn of the external wheel, this wheel pivots counter clockwise way.
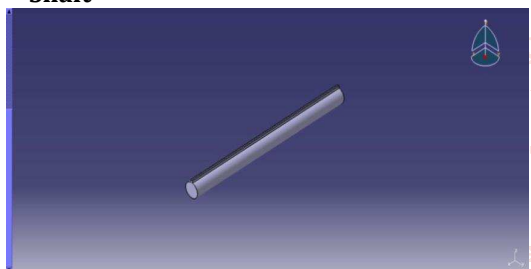
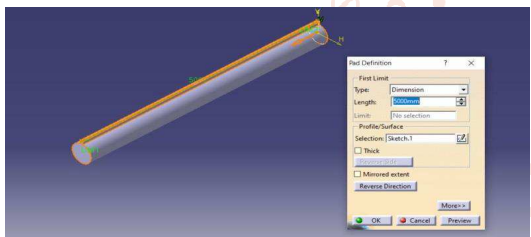### 4.1.9. Shaft

Figure 4.14 Shaft in 3D Model

Figure 4.15 Shaft Length

The above figure 4.14 and 4.15 shows the Shaft in 3D sketch and shaft extruded length.

The shaft is utilized to communicate the external wheel pivot as the mechanical contribution to the alternator.

The shaft is associated with alternator utilizing coupling. The shaft turns the counter clockwise way dependent on the bearing Outer Wheel which is utilized to send the revolution (fig.4.13).
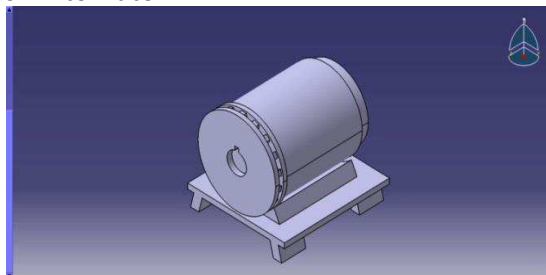
4.1.10. Alternator

Figure 4.16 Alternator Setup in 3D Sketch

The above figure 4.16 shows the alternator setup in 3D sketch. The alternator is used to receive the rotational motion of the outer wheel (as mechanical input) and convert it into the electrical input.

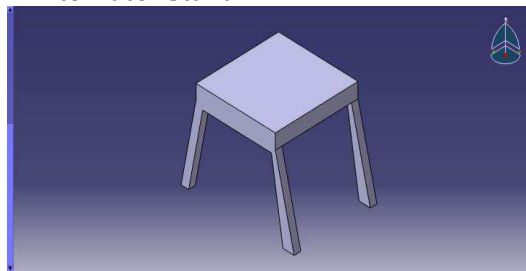### 4.1.11. Alternator Stand

Figure 4.17 Alternator Stand in 3D Sketch

The above figure 4.17 shows the alternator stand in 3D sketch. The alternator stand is used to hold the alternator in same position when receiving the input.

4.2. Working Simulation of the Model

The process of working operation is explained using the figure (1) "Assembly of the Model". The working is "An operator sitting on the seat provided inside the wheel can use the J stick to go up inside the inner wheel, thus shifting the centre of gravity (CG) of the system to move forward. This movement of CG in the forward way makes the toothed outer wheel to rotate. Since the outer wheel associated with the gear wheels of GB start rotating when the person moves forward in his sitting position, the dynamo associated with the gear box shall produce electricity. Here the operator exerts minimum energy using the J stick to go up in the sitting position". The energy generated from the human work-out is mainly utilized for generating the basic electric appliances (like fan, tv, etc.) which is used by all people regularly. Energy generation varies based on the usage of technology. The energy generating depends on the work out capability of human being and it is defined mainly in terms of body mass index of human being. The work mainly focuses on the main factor such as complete human body, energy generation for the basic and miscellaneous equipment for domestic purpose.

V. Design of rocking chair model
5.1. Tool used

The device utilized for the calculation of the issues is ANSYS 17.2. ANSYS 17.2 is the investigation programming bundle offers many examining frameworks like static primary, Modal Analysis, Dynamic Analysis, Thermal examination and so forth In this work, the unbending elements examination is utilized.

5.2. Rigid Dynamics

Mechanical frameworks frequently contain complex gatherings of interconnected parts going through enormous by and large movement. Models can be found in a wide scope of uses incorporating suspension amasses in ground vehicles, automated controllers in assembling cycles and setting down gear frameworks in airplane.

Mimicking the movement of these frameworks by expecting completely adaptable parts and afterward conveying conventional limited components techniques for the arrangement is computationally costly, regularly making plan investigation and streamlining unreasonable. For a quicker, more effective answer for this class of issues, ANSYS gives an extra module to unbending multi-body elements examination.

With an insignificant interest in model arrangement and computational assets, ANSYS Rigid Dynamics prompts a profound comprehension of the movement and dependability of mechanical frameworks prior in the advancement cycle, when educated designing choices are basic. At that point, if greater constancy is needed as definite plans arise, an ANSYS Rigid Dynamics model can undoubtedly be changed over to a somewhat or completely adaptable portrayal, one that is fit for catching huge distortions and material nonlinearities.

5.3. Procedure for doing Rigid Dynamics Analysis in Ansys:

The procedure for doing rigid dynamics analysis in ansys software is

5.3.1. Engineering Data:

In this section, the materials with the properties to be given as input in order to add while doing analysis. The material chosen for this work is PA12 (Nylon 12).

5.3.1.1. Properties of Nylon 12

The Properties of Nylon 12 (PA 12) are

1. PA 12 (also known as Nylon 12) is a good general-use plastic with broad additive applications and is known for its toughness, tensile strength, impact strength and ability to flex without fracture.

2. PA 12 has long been used by injection molders due to these mechanical properties.

3. PA 12 has been adopted as a common material in additive manufacturing processes for creating functional parts and prototypes.

5.3.2. Mechanical Properties of Nylon 12

The properties to be given for the Engineering data in are

1. Density = 1.01 g/cm^3
2. Young's Modulus= 1935MPa
3. Tensile Ultimate Strength= 20Mpa
4. Tensile Yield Strength= 25Mpa
5. Compressive Yield Strength=10MPa
6. Poisson Ratio=0.4

5.3.3. Geometry

In this section, the part file of the Assembly model designed using the CATIA software to be imported. For importing the file, the Space Claim tool is used. Space Claim is used to import the Part file as in the CATIA Software. In this section, the orientation of the assembly can be done to give the conditions while doing analysis.

5.3.4. Model

In this module, the various options available are Geometry, Connections, Mesh, Rigid Dynamics and Solution.

5.3.4.1. Geometry

In this section, the material Nylon 12 is added to all parts. By this material is imported to all parts.

5.3.4.2. Connections

In this part, the joints are created using the option Joints in menu bar. In the joints option, select face of the component individually. By selecting this option, the parts to be revolved are created primarily. In Rigid Dynamics section, the components selected in this section are projected.
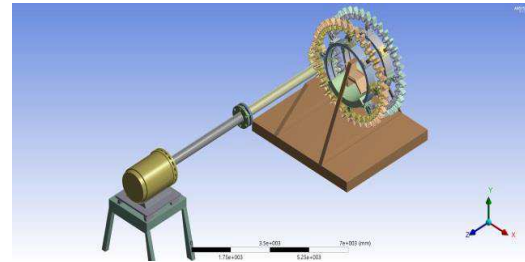
5.3.4.3. Mesh

Figure 5.2 Mesh

The figure 5.2 shows the meshing. The meshing of all the parts is to be done. In this, the condition given is the Adaptive type mesh with Fine sizing. By doing the fine meshing, the whole assembly is discretized finely and analyzed completely.
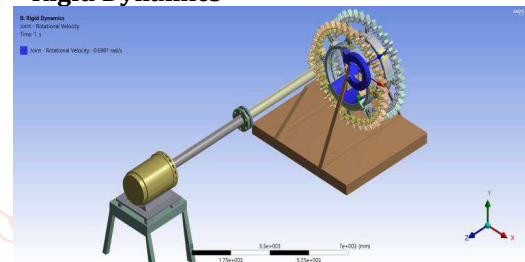
5.3.5. Rigid Dynamics
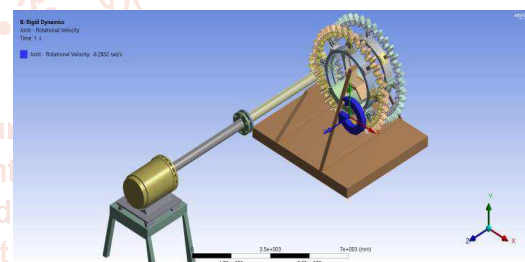

Figure 5.3 Joint for the Chair Setup

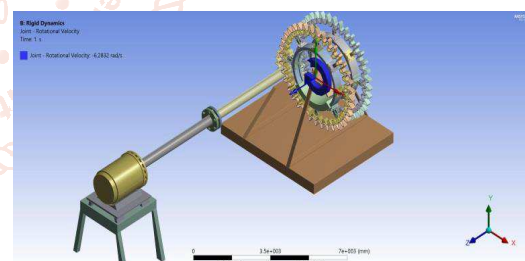**Figure 5.4 Joint for the Ratchet and Pawl**

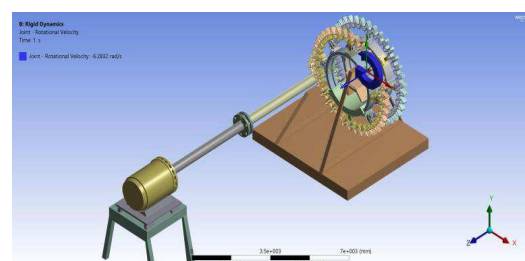**Figure 5.5 Joint for the Outer Support Wheel**

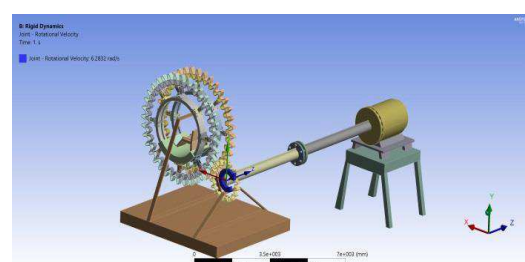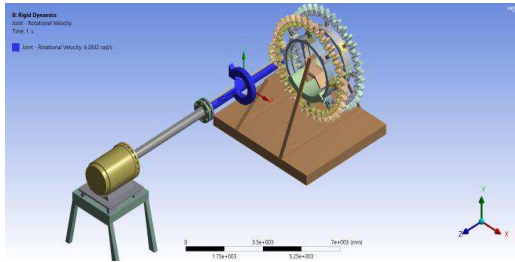**Figure 5.6 Joint for the Outer Wheel**

Figure 5.7 Joint for the Outer Wheel

Connected with shaft


Figure 5.8 Joint for the Shaft

The figures show the conditions to be given in the rigid dynamics section in ansys.

Figure 5.3, 5.4, 5.5, 5.6, 5.7 and 5.8 are the conditions to be given for chair, ratchet and pawl, outer support wheel, outer wheel, outer wheel connected with shaft and shaft respectively.

5.3.5.1. Connections for the parts

Based on the joints created for the parts in Connections section, the input values for parts are to be given in Rigid Dynamics section as, Rigid Dynamics Joints Rotational Velocity.

1. For the chair setup, select the face of the chair and give the input value for the component is 400 in clockwise directions.

2. For all the ratchet and pawl setup, select the face of the setup individually and give the input value of 3600 in clockwise direction.

3. For the outer support wheel, select the face of the outer support wheel and give the input value for the component is 3600 in clockwise directions.

4. For the outer wheel setup, select the face of the outer wheel and give the input value for the component is 3600 in clockwise directions.

5. For the outer wheel connected with shaft setup, select the face of the outer wheel connected with shaft and give the input value for the component is 3600 in counter-clockwise directions.

6. For the shaft setup, select the face of the shaft and give the input value for the component is 3600 in counter-clockwise directions.

5.3.6. Solution
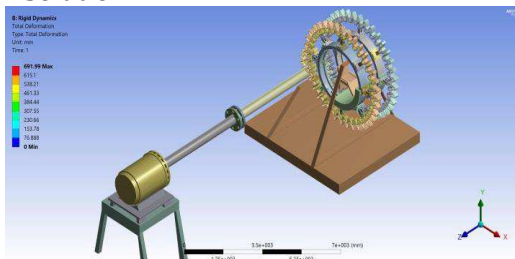
Figure 5.9 Total Deformation
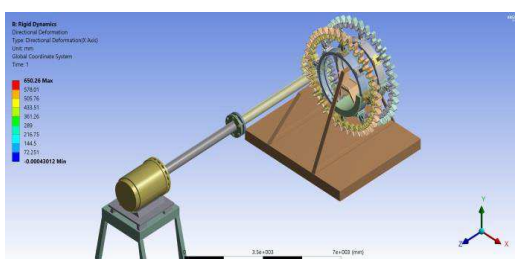
Figure 5.10 Directional Deformation

In this section, select Solution Total deformation and select Solution Directional Deformation. The figure 5.9 shows the total deformation for the whole assembly of 691.99mm. The figure 5.10 shows the directional deformation in X-Axis for the whole assembly of 650.26mm. The deformation values are calculated based on the constraints given for individual components in the rigid dynamics section.

VI. Conclusion And Future works

The rocking chair and ratchet-pawl mechanisms are used in work. The design of rocking chair housed inside the wheel is done using the CATIA V5 R20 software tool. This work is used for the energy generation for domestic purpose. This work helps to reduce the energy problem in future needs. The complete workout plays vital role in this work in order to give a complete workout to human body parts with less effort. The domestic needs can be fulfilled based on the human workout condition. The energy generation can be used in emergency situation and in future purposes. The workout will help to give us a good feel and healthy life with useful energy generation purpose. The energy generation will ever helpful in human daily needs. The energy generation is mainly based on the human workout. Based on the workout the rotary motions are converted to electrical energy using the alternator and belt drives and stored in battery for future needs. This work is mainly applied primarily to satisfy domestic needs.

6.1. Future Works

Applied for funding agencies like PRISM, ANGEL. Based on the funding amount the fabrication will be executed.

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